

**Overview of Hydrologic Model Simulations for the  
Lower East Coast Regional Water Supply Plan**  
January 5, 2000

**Status of Model Runs:**

Four simulations (LEC 1995 Base, the LEC 2020 Base, the LEC 2020 with Restudy, and the LEC 2020 with Restudy - No Pump (or no Public Water Supply)) by three models (the regional South Florida Water Management Model (SFWMM) and Broward and North Miami-Dade subregional groundwater models) were completed in December 1999 (see Table 1). The results have been processed to create performance measure graphics and are available on this web site. The LEC Hydrologic Model Results web page includes results for both the regional and subregional models. It is expected that the North Palm Beach, South Palm Beach and South Dade groundwater models will be run soon and results available in January 2000.

**Table 1. Status of Hydrologic Model Simulations LEC 2020 Plan**

	<b>Model Ready to Run</b>	<b>1995 Base Case</b>	<b>2020 Base Case</b>	<b>2020 w/Restudy</b>	<b>2020 w/Restudy- No Pump</b>
SFWMM	yes	Done	Done	Done	Done
North Palm Beach	no	Jan 2000	Jan 2000	Jan 2000	Jan 2000
South Palm Beach	yes	Jan 2000	Jan 2000	Jan 2000	Jan 2000
Broward	yes	Done	Done	Done	Done
North Miami-Dade	yes	Done	Done	Done	Done
South Miami-Dade	no	Jan 2000	Jan 2000	Jan 2000	Jan 2000

The four runs completed by each model consists of the LEC 1995 Base, the LEC 2020 Base, the LEC 2020 with Restudy, and the LEC 2020 with Restudy - No Pump (or no Public Water Supply). See Table 2 for acronyms used to refer to these runs on the hydrologic model results i.e., performance measure graphics. More information about the regional SFWMM and the subregional groundwater MODFLOW models as well as model input in common can be found on the LEC Hydrologic Model Results web page at "[About the Models](#)"

**Table 2: Acronyms for SFWMM runs and Regional Boundary Conditions for Groundwater Models**

SFWMM run	SFWMM Run acronym	GW Model Run	GW Model Run acronym
1995 Base	LEC95	1995 Base	95Base
2020 Base	20BSU1	2020 Base	20Base
2020 w/Restudy	20WRU1	2020 w/Restudy	20wres
2020 w/Restudy - No PWS	20WRNU	2020 w/Restudy - No Pump	resnopump

### **Understanding the Base Cases:**

The regional and subregional models simulate hydrology of south Florida on a daily basis including major components of the hydrologic cycle: rainfall, evapotranspiration, infiltration, groundwater flow, canal flow, canal-groundwater seepage, levee seepage and groundwater withdrawals. The SFWMM uses the climatic conditions from 1965-1995 period, which includes droughts, and wet periods while the subregional groundwater models use the dry period January 1989 to December 1990. The 1995 Base Case run provides an understanding of the how management regime in place in 1995 performed under these historic climatic conditions. The 2020 Base Case provides information of how the system performs with anticipated future operations and projects under the same historic climatic conditions. Comparisons of the 1995 and 2020 Base Cases will show system performance with increased demands and inclusion of new projects and operating criteria. The LEC 2020 with Restudy runs provide information on how the system performs with the Restudy projects and 2020 demands and operating criteria.

The fourth model run, the LEC 2020 with Restudy - No pump (or No Public Water Supply), was simulated to understand the impact permitted consumptive uses may have on the system. Using the subregional groundwater models, the effect on wetlands can be evaluated by comparing the LEC 2020 with Restudy run to the LEC 2020 with Restudy - No pump run. However, the manner in which the SFWMM and groundwater models simulate this run varies. The SFWMM does not include public water withdrawals in the Lower East Coast (Palm Beach, Broward, Miami-Dade, and Monroe counties), but includes agricultural and landscape irrigation demands. The groundwater models more closely mimic the permit review process by eliminating all consumptive uses - public water demands, agriculture, and landscape irrigation - within the models' boundaries from this run.

### **Model Run Differences:**

The major differences between model runs are 1) changes in public water supply demands and locations of withdrawals, 2) the inclusion of future projects and components, 3) modifications in the Lake Okeechobee and Water Conservation Areas operation schedules, and 4) changes in the land use between 1995 and 2020 and the resulting effect on agriculture and landscape irrigation demands. Summaries of the 1995 and 2020 Base Cases for the SFWMM and MODFLOW models can be found at "[Base Case and Alternative Descriptions](#)" on the LEC model web page. A simplified description of the 1995, 2020, and 2020 with Restudy runs can also be found on this web page. The simplified description includes a list of Restudy components included in the LEC

2020 with Restudy run. Please refer to these web page documents to understand the modifications in the Lake Okeechobee and Water Conservation Areas operation schedules, and changes in the land use between 1995 and 2020.

### **Public Water Supply Demands:**

Among the differences between the 1995 and 2020 model runs, changes to public water supply demands and locations of withdrawals are of great interest. There are two demand or allocation sets: [1995 and 2020](#). The 1995 demands are actual average annual demands for that historical year. The 2020 demands are a projection of future demands provided by public water suppliers to the SFWMD Planning Department in January 1999. These 2020 average annual demands are used in two of the 2020 runs (LEC 2020 Base Case and LEC 2020 with Restudy).

The physical location of public water withdrawals also varies between the 1995 and 2020 model runs. In the 1995 Base Case, withdrawals are similar to historic conditions in 1995, i.e., only wells existing in 1995 and the corresponding wellfield distribution were included. In the future 2020 model runs, locations of withdrawals include new wells built since 1995 and proposed locations provided by the public water suppliers to the Planning Department in January 1999. See the "Public Water Supply Service Area and Existing and Proposed Wellfields" for maps of the well locations, see ["Model Input"](#). The locations provided by the utilities are composed of their "best guess" of future withdrawal sites and the resulting distribution among the wellfields, refer to ["Summary of Public Water Supply Wellfield Distribution."](#) To view how the SFWMM simulates these demands at the utilities preferred locations, refer to the ["Spatial Distribution of Public Water Supply Demands"](#) for each of the bases. Some utilities proposed many new wells to meet future demands while others do not foresee constructing new wells by 2020.

**Public Water Supply Performance:** It is expected that the LEC 2020 with Restudy hydrologic model results will indicate a greater number of water supply cutbacks due to low groundwater levels along the coast than the Restudy D13R run (Recommended Plan) completed in May 1998. The greater number of cutbacks in the LEC run is due primarily to the location of the public water supply withdrawals since little variation exists between the average annual demands for the LEC Plan and the Restudy. When surveyed in January 1999, the LEC utilities generally expected to depend on existing wells or only move a small portion of their demands west, away from the saline interface by 2020. In the Restudy D13R run, all or a significant portion of the demands for eleven coastal utilities were moved west to alleviate the pressure on coastal groundwater supplies.

A secondary reason for the change in water supply performance between the SFWMM simulations (LEC Bases and the Restudy) and the groundwater models relates to the performance measure themselves. The SFWMM and the groundwater models simulate the SFWMD water shortage policy by cutting back water supply demands when Lake Okeechobee's levels are low or groundwater heads along the Lower East Coast are low and may increase the risk of salt water intrusion. The SFWMM and the groundwater models use the same restriction criteria for the lake and the same restriction criteria and locations to measure groundwater heads at the coastal "trigger wells". The map depicting the ["Frequency and severity of water restriction triggers,"](#) captures results from SFWMM by counting the number of times a water restriction is initiated. It does not capture the duration of the restrictions. Results from the groundwater models are depicted in

a map named "[Frequency and severity of water restriction by location](#)." It counts the number of days a water restriction is imposed. Most often the number of days a restriction is imposed will be much greater than the number of times in a given simulation. A comparison of simulated groundwater heads indicates that generally, the SFWMM and the groundwater models initiate water supply cutbacks at the same time under the similar conditions, however, this is not captured by the performance measure graphics.

**Restudy Components:**

The second primary difference between the LEC runs is inclusion of future projects and components. The LEC 2020 with Restudy only includes those Restudy components expected to be completed by 2020. According to the Restudy Implementation Plan, all components are to be completed except for the Lakebelt Storage Areas. Only half of the total volume of the final projects, North and Central Lakebelts, will be available in 2020. [A list of the components](#) in the 2020 with Restudy run distinguishes between the Restudy components simulated in the SFWMM and MODFLOW groundwater models.